SAMSUNG

MICROWAVE OVEN

CE1279KSE

SERVICE Manual

MICROWAVE OVEN

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BWT

PRECAUTIONS TO BE OBSERVED BEFORE AND DURING SERVICING TOAVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY

(a) Do not operate or allow the oven to be operated with the door open.
(b) Make the following safety checks on all ovens to be serviced before activating the magnetron or other microwave source, and make repairs as necessary:
  (1) Interlock operation,
  (2) proper door closing,
  (3) seal and sealing surfaces (arcing, wear, and other damage),
  (4) damage to or loosening of hinges and latches,
  (5) evidence of dropping or abuse.
(c) Before turning on microwave power for any service test or inspection within the microwave generating compartments, check the magnetron, wave guide or transmission line, and cavity for proper alignment, integrity, and connections.
(d) Any defective or misadjusted components in the interlock, monitor, door seal, and microwave generation and transmission systems shall be repaired, replaced, or adjusted by procedures described in this manual before the oven is released to the owner.
(e) A Microwave leakage check to verify compliance with the Federal performance standard should be performed on each oven prior to release to the owner.

1. Precaution

Follow these special safety precautions. Although the microwave oven is completely safe during ordinary use, repair work can be extremely hazardous due to possible exposure to microwave radiation, as well as potentially lethal high voltages and currents.

1-1 Safety precautions (⚠)

1. All repairs should be done in accordance with the procedures described in this manual. This product complies with Federal Performance Standard 21 CFR Subchapter J (DHHS).

2. Microwave emission check should be performed to prior to servicing if the oven is operative.

3. If the oven operates with the door open : Instruct the user not to operate the oven and contact the manufacturer and the center for devices and radiological health immediatly.

4. Notify the Central Service Center if the microwave leakage exceeds 5 mW/cm^2

5. Check all grounds.

6. Do not power the MWO from a "2-prong" AC cord. Be sure that all of the built-in protective devices are replaced. Restore any missing protective shields.

7. When reinstalling the chassis and its assemblies, be sure to restore all protective devices, including: nonmetallic control knobs and compartment covers.

8. Make sure that there are no cabinet openings through which people--particularly children--might insert objects and contact dangerous voltages. Examples: Lamp hole, ventilation slots.

9. Inform the manufacturer of any oven found to have emmission in excess of 5 mW/cm^2, Make repairs to bring the unit into compliance at no cost to owner and try to determine cause.
   Instruct owner not to use oven until it has been brought into compliance.

   CENTRAL SERVICE CENTER

10. Service technicians should remove their watches while repairing an MWO.

11. To avoid any possible radiation hazard, replace parts in accordance with the wiring diagram. Also, use only the exact replacements for the following parts: Primary and secondary interlock switches, interlock monitor switch.

12. If the fuse is blown by the Interlock Monitor Switch: Replace all of the following at the same time: Primary and secondary switches, as well as the Interlock Monitor Switch. The correct adjustment of these switches is described elsewhere in this manual. Make sure that the fuse has the correct rating for the particular model being repaired.

13. Design Alteration Warning:
    Use exact replacement parts only, i.e., only those that are specified in the drawings and parts lists of this manual. This is especially important for the Interlock switches, described above. Never alter or add to the mechanical or electrical design of the MWO. Any design changes or additions will void the manufacturer's warranty.10.Always unplug the unit's AC power cord from the AC power source before attempting to remove or reinstall any component or assembly.

14. Never defeat any of the B+ voltage interlocks. Do not apply AC power to the unit (or any of its assemblies) unless all solid-state heat sinks are correctly installed.

15. Some semiconductor ("solid state") devices are easily damaged by static electricity. Such components are called Electrostatically Sensitive Devices (ESDs). Examples include integrated circuits and field-effect transistors.

    Immediately before handling any semiconductor components or assemblies, drain the electrostatic charge from your body by touching a known earth ground.

1-2 Special Servicing Precautions (Continued)

16. Always connect a test instrument's ground lead to the instrument chassis ground *before* connecting the positive lead; always remove the instrument's ground lead last.
17. When checking the continuity of the switches or transformer, always make sure that the power is OFF, and one of the lead wires is disconnected.
18. Components that are critical for safety are indicated in the circuit diagram by shading, ⚠ or ⚠ .
19. Use replacement components that have the same ratings, especially for flame resistance and dielectric strength specifications. A replacement part that does not have the same safety characteristics as the original might create shock, fire or other hazards.

1-3 Special High Voltage Precautions

1. High Voltage Warning
   Do not attempt to measureany of the high voltages--this includes the filament voltage of the magnetron. High voltage is present during any cook cycle.

   Before touching any components or wiring, always unplug the oven and discharge the high voltage capacitor (See Figure 1-1)

2. The high-voltage capacitor remains charged for about 30 seconds after disconnection. Short the negative terminal of the high-voltage capacitor to to the oven chassis. (Use a screwdriver.)

3. High voltage is maintained within specified limits by close-tolerance, safety-related components and adjustments. If the high voltage exceeds the specified limits, check each of the special components.

Fig. 1-1. Discharging the High Voltage Capacitor

2. Specifications

2-1 Table of Specifications

TIMER	99 MINUTES 00 SECONDS
POWER SOURCE	230V 50Hz, AC
POWER CONSUMPTION	MICROWAVE : 1,500W GRILL : 1,450W CONVECTION : 1,470W
OUTPUT POWER	FROM 85W TO 850W (10 LEVEL POWER) (IEC-705 TEST PROCEDURE)
OPERATING FREQUENCY	2,450MHz
MAGNETRON	OM75PH(31)ESS
COOLING METHOD	COOLING FAN MOTOR
OUTSIDE DIMENSIONS	547(W) x 352(H) x 516(D)

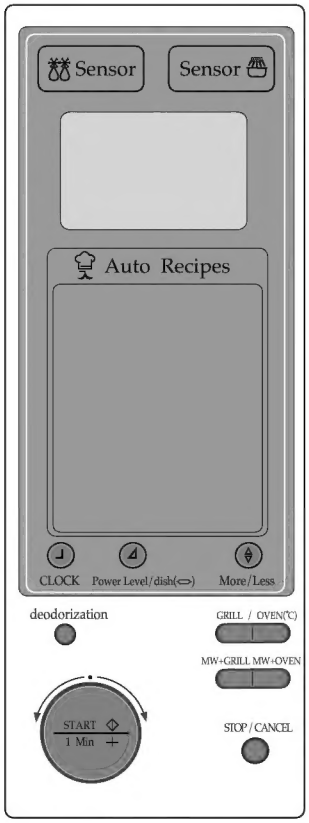
POWER LEVEL		ON TIME	OFF TIME
%	CE1279KSE		
10%	85W	4 sec	26 sec
20%	170W	7 sec	23 sec
30%	255W	10 sec	20 sec
40%	340W	13 sec	17 sec
50%	425W	16 sec	14 sec
60%	510W	19 sec	11 sec
70%	595W	22 sec	8 sec
80%	680W	25 sec	5 sec
90%	765W	28 sec	2 sec
100%	850W	30 sec	0 sec

2-2 Comparison Chart

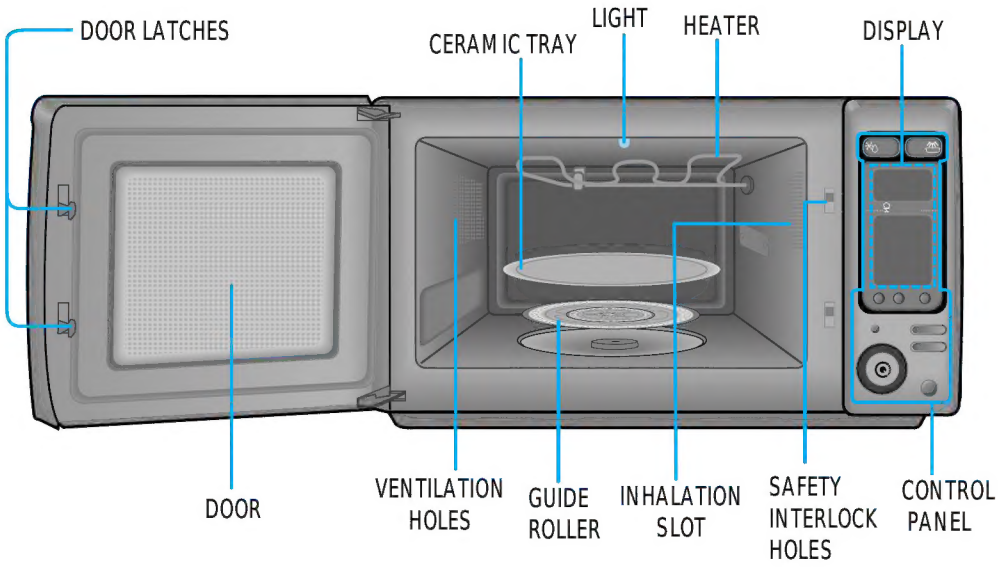
MODEL / FEATURE	CE1279KSE
MORE/LESS	¡
AUTO COOK/DISH	¡
AUTO DEFROST	¡
AUTO REHEAT	¡
TIME COOK	¡
POWER LEVEL	¡
GRILL	¡
MICROWAVE+GRILL(CYCLE)	¡
MICROWAVE+CONVECTION(CYCLE)	¡
CONECTION	¡

3. Operating Instructions

3-1 Control Panel



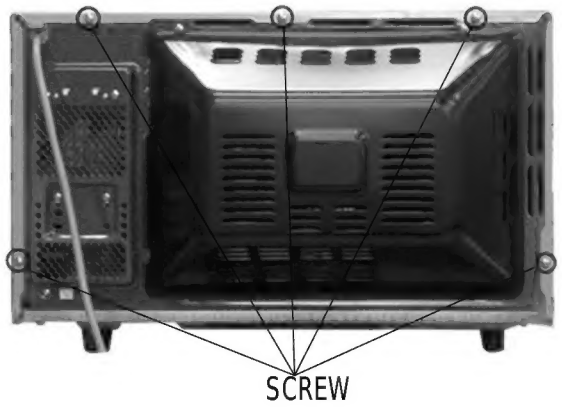
3-2 Features & External Views



4. Disassembly and Reassembly

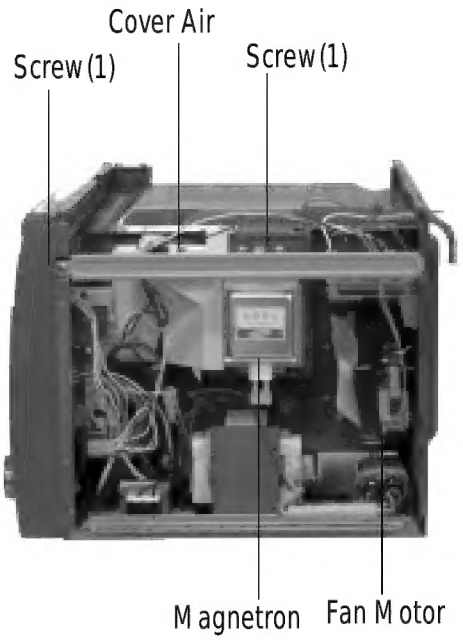
4-1 Removal of Outer Panel

1. Remove five screws from the rear section.
2. Lift the outer panel by pulling it backwards



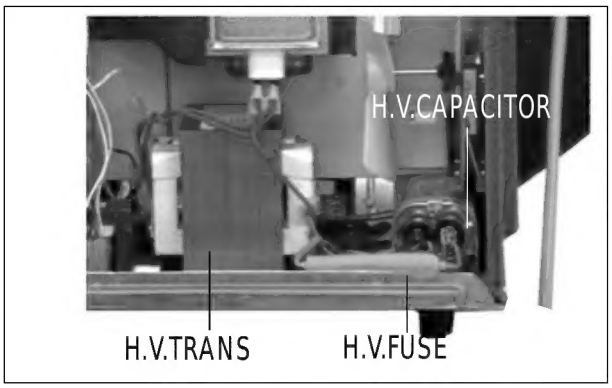
4-2 Replacement of Magnetron and Fan Motor

1. The magnetron includes the shield case, permanent magnet, check coils and 500pF capacitors (all contained in one assembly).
2. Discharge the high voltage capacitor. (See page1-2)
3. Disconnect all lead wires from the magnetron.
4. Remove screw(1) securing the magnetron supporter.
5. Remove the magnetron supporter.
6. Remove the air cover
7. Remove screw(1) securing the assy thermal cutout switch.
8. Remove screws securing the magnetron to the wave guide.
9. Remove the magnetron very carefully.
10. Remove screws from the back panel to take out fan motor.
11. When removing the magnetron, make sure that its antenna does not hit any adjacent parts.
12. When replacing the magnetron, be sure to remount the magnetron gasket in the correct position, and make sure the gasket is in good condition.



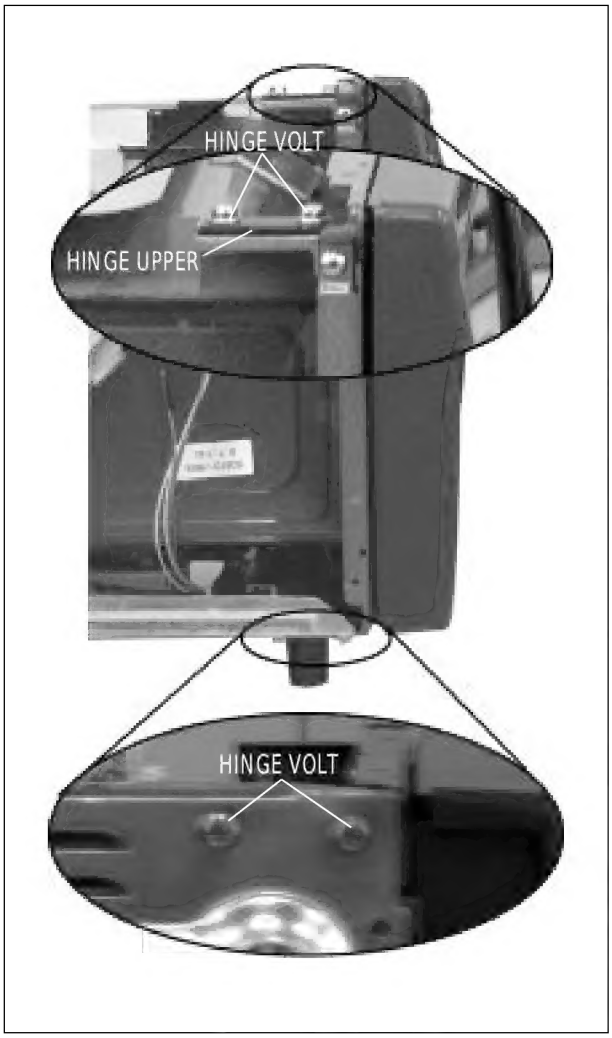
4-3 Replacement of High Voltage Transformer

1. Discharge the high voltage capacitor. (See page 1-2)
2. Disconnect all the leads.
3. Remove four screws.
4. When replacing, connect the leads securely.



4-4 Replacement of Door Assembly

1. Remove bolts securing the upper hinge and lower hinge, then remove the door assmbly.
2. After replacing the door, check the operation of the primary interlock switch and the interlock monitor switch.
3. Microwave emission should not exceed 5mW/cm² (All service adjustments should be made for minimum RF emission.)

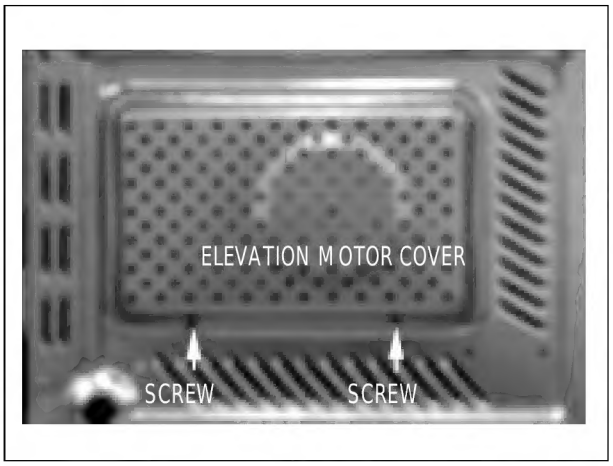


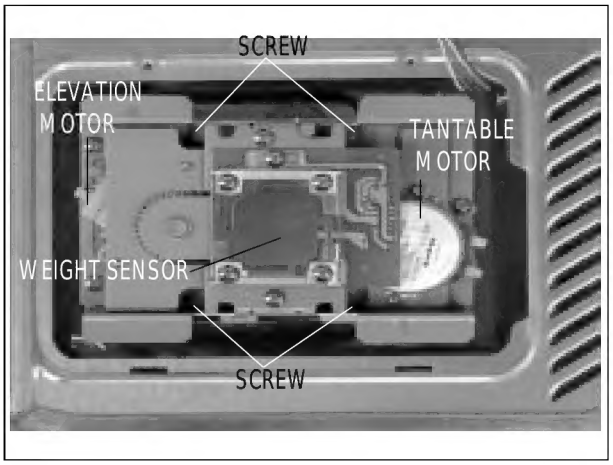
4-5 Replacement of Lamp

1. Disconnect harness-"A" assembly.
2. Remove screw securing the lamp cover

4-6 Replacement of Elevation Motor

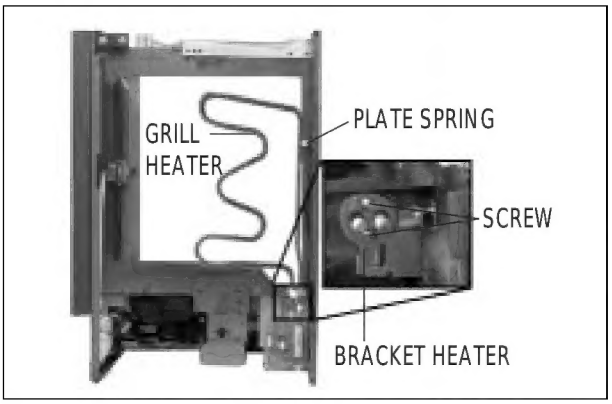
1. Remove the ceramic tray and assembly from cavity.
2. Turn the oven upside down.
3. Remove screws securing the elevation motor cover.
4. Disconnect all lead wires from the elevation motor.
5. Remove screws securing the elevation motor to the cavity.
6. Remove the elevation motor.
7. When replacing the elevation motor, be sure to remount it in the correct position.
8. Reconnect all the leads to the elevation motor.
9. Screw the elevation motor cover to the base plate with screw driver.
10. Remount the coupler in the correct position.





4-7 Replacement of Grill Heater

1. Remove the outer panel.
2. Disconnect all the connectors and terminals on the heater and noise filter assembly.
3. Unscrew nuts securing the grill heater.



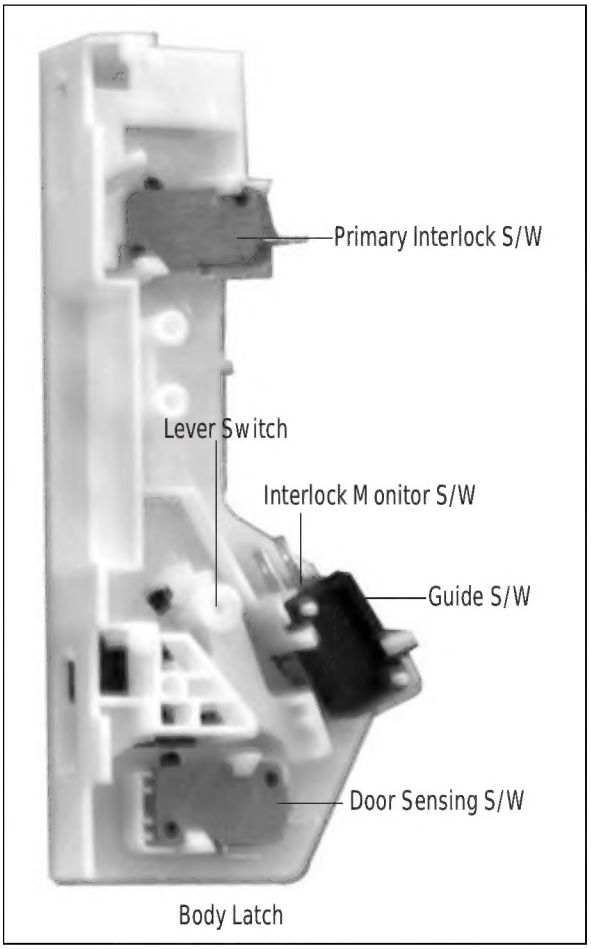
4-8 Replacement of Interlock Monitor Switch and Door Sensing Switch

1. Disconnect all lead wires from the interlock monitor switch and the door sensing switch.
2. Push up the mounting tabs.
3. Make necessary adjustments Do the microwave emission check according to "ALIGNMENT AND ADJUSTMENTS" on page 5-2(whenever they any repaired or replaced).

4-9 Replacement of Primay Interlock Switch

1. Disconnect all lead wires from the primary interlock switch.
2. Push up the mounting tabs which support the primary interlock switch.
3. Make necessary adjustments and microwave emision check according to "ALIGNMENT AND ADJUSTMENTS" on page 5-2(whenever they are repaired or replaced).

Interlock Switch Replacement
When replacing defective switches, be sure to check that the pointing tabs are not bent or broken.

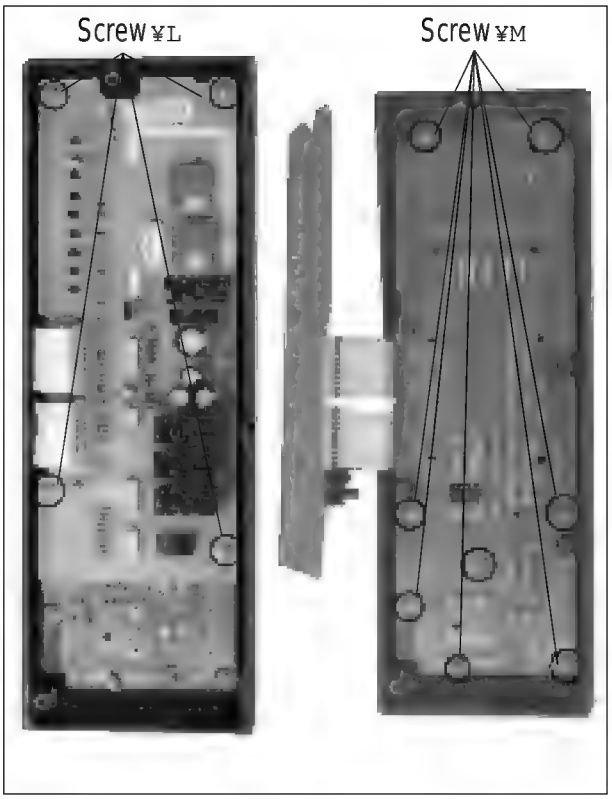


4-10 Replacement of Fuse

1. Disconnect the oven from the power source.
2. Remove the 10A fuse from the fuse holder.
3. When replacing the 10A fuse, use an exact replacement and check the primary interlock , door sensing and interlock monitor switches.
4. When the above switches operate properly, check that the control circuit transformer is not defective.

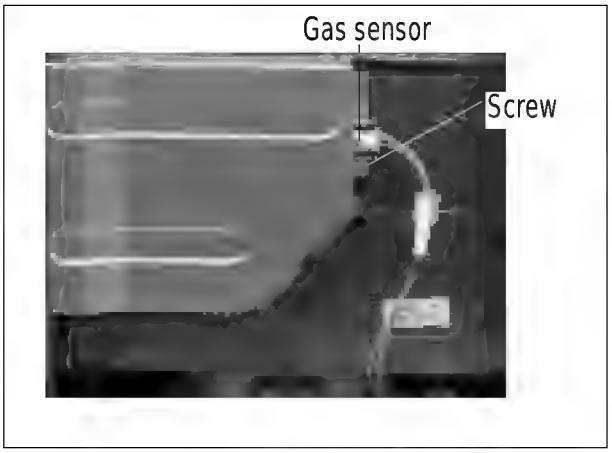
4-11 Replacement of Control Circuit Board

1. Be sure to disclyarge any static electricity from your body, and avoid touching the "Touch control" clrcuitry.
2. Disconnect the connectors from the control circuit board.
3. Remove screws ¥L and ¥Msecuring the control circuit bord.
4. Lift up the control circuit board from right side and remove the hooks holding the contol circuit board to the box assembly.



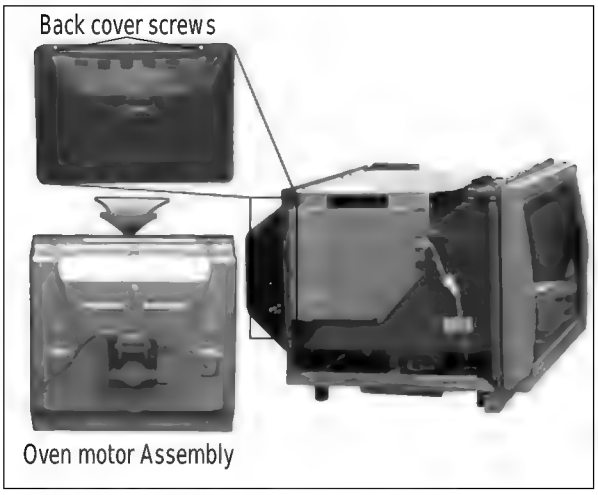
4-12 Replacement of Gas Sensor

1. Disconnect all lead wires from the gas sensor.
2. Remove screws securing the air guide.



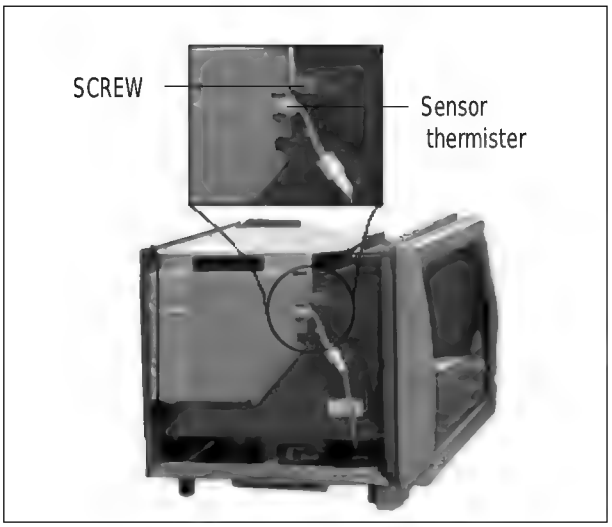
4-13 Replacement of Back cover and Oven motor assembly

1. Remove two screw from the back cover.
2. Disconnect all lead wires from the oven motor.
3. Remove form screw form the oven motor assembly.
4. Adjustment or exchange.
5. Reconnect all the lead wires.



4-14 Replacement of Sensor Thermister

1. Remove screw(1) securing the sensor thermister.
2. Disconnect all lead wires from the mian wire.



5. Alignment and Adjustments

PRECAUTION

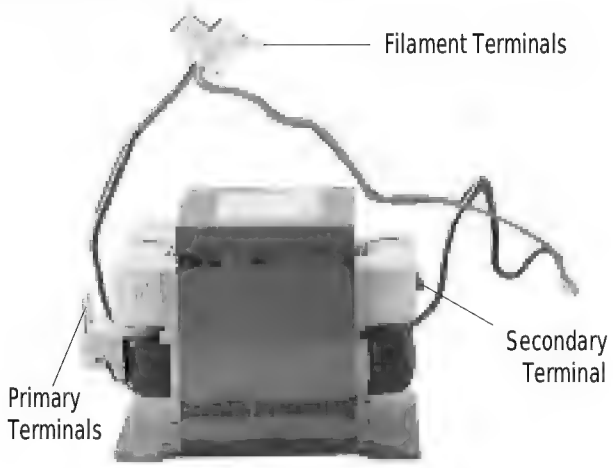
1. High voltage is present at the high voltage terminals during any cook cycle.
2. Do not attempt to measurement the high voltage.
3. Before touching any oven components or wiring, always unplug the oven and discharge the high voltage capacitor.

5-1 High Voltage Transformer

1. Remove connectors from the transformer terminals and check continuity.
2. Normal resistance readings are as follows:

MODEL	CE1279KSE
Secondary	Approx. 96Ω
Filament	Approx.0Ω
Primary	Approx.1.58Ω

(Room temperature = 20°C)



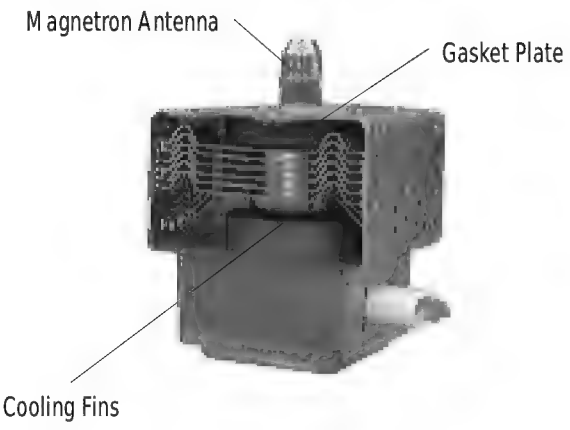
5-2 Low Voltage Transformer

1. The low voltage transformer is located on the base plate.
2. Remove the low voltage transformer from the base plate and check continuity.
3. Normal resistor readings a shown in the table.

Terminals	Resistance
1~2(11V)	0.56Ω
1~3(Input)	77.27Ω
4~5(Output 17.5V)	1.39Ω
5~6(Output 7.3V)	0.6Ω
7~8(Output 3.2V)	0.61Ω
8~9(Output 2.7V)	0.51Ω

5-3 Magnetron

1. Continuity checks indicate only an open filament or a shorted magnetron. To diagnose an open filament or shorted magnetron, do the following:
2. Isolate the magnetron from the circuit by disconnecting its leads.
3. A continuity check across the magnetron filament terminals should indicate one ohm or less.
4. A continuity check between each filament terminal and the magnetron case should read open.



5-4 High Voltage Capacitor

1. Check continuity of the capacitor with the meter set at the highest resistance scale.
2. Once the capacitor is charged, a normal capacitor shows continuity for a short time, and then indicates 9MΩ.
3. Shorted capacitor indication: continuity.
4. Open capacitor noication constant 9MΩ.
5. Resistance between each terminal and chassis should read infinite.

5-5 High Voltage Diode

1. Isolate the diode from the circuit by disconnecting its leads.
2. With the ohm-meter set at the highest resistance scale, measure across the diode terminals. Reverse the meter leads and read the resistance.

   A meter with 6V, 9V or higher voltage batteries should be used to check the front-to back resistance of the diode. (Otherwise an infinite resistance may be read in both directions.) The resistance of a normal diode will be infinite in one direction and several hundred KΩ in the reverse direction.

5-6 Main Relay and Power Control Relay

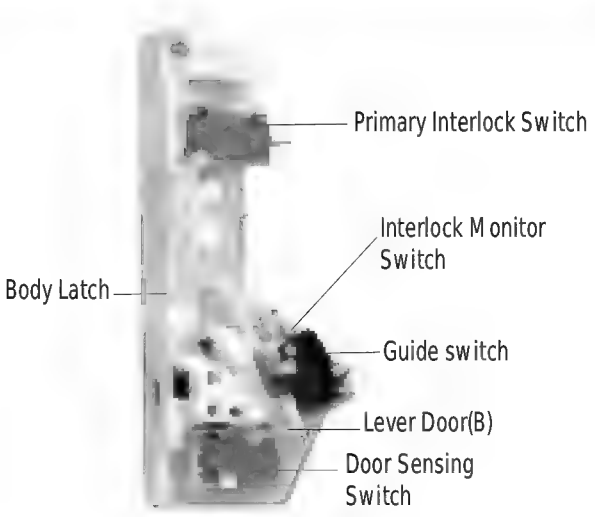
1. The relays are located on the PCB Ass'y. Isolate them from the main circuit by disconnecting the leads.
2. Operate the microwave oven with a water load. Set the power level to "high"
3. Check continuity between terminals of the relays after the start pad is pressed.

5-7 Adjustment of Primary Switch, Door Sensing Switch and Monitor Switch

Precaution

For continued protection against radiation hazard, replace parts in accordance with the wiring diagram and be sure to use the correct part number for the following switches: Primary and secondary interlock switches, and the interlock monitor switch (replace all together). Then follow the adjustment procedures below. After repair and adjustment, be sure to check the continuity of all interlock switches and the interlock monitor switch.

1. When mounting primary switch and interlock monitor switch to latch body, consult the figure.
2. No specific adjustment is necessary during installation of primary switch and monitor switch to the latch body is necessary.
3. When mounting the Latch Body to the oven assembly, adjust the Latch Body by moving it so that the oven door has vo "play". Check for play by pulling the door assembly. Make sure that the latch keys move smoothly after adjustment is completed. Completely tighten the screws holding the latch body to the oven assembly.
4. Reconnect to Monitor switch and re-check that the the monitor circuit and all latch switches are secured.(see components test procedures).
5. Confirm that the gap between the switch housing and the switch actuator is no more than 0.5mm when door is closed.



	Door Open	Door Closed
Primary switch	∞	0
Monitor switch (COM-NC)	0	∞
Monitor switch (COM-NO)	∞	0
Door Sensing S/W	∞	0

5-8 Output Power of Magnetron

CAUTION
MICROWAVE RADIATION

DO NOT ALLOW EXPOSURE TO MICROWAVE RADIATION FROM ANY PARTS CONDUCTING MICROWAVE ENERGY.

The output power of the magnetron can be measured by performing a water temperature rise test.
Equipment needed :
* One 1-liter cylindrical borosilicate glass vessel (Outside diameter 190 mm)
* One glass thermometer with mercury column
NOTE: Check line voltage under load. Low voltage will lower the magnetron output. Brenk the line here make all temperature and time tests with accurate equipment.

1. Fill the one liter glass vessel with water.
2. Stir water in glass vessel with thermometer, and record glass vessel's temperature ("T1", 10±1°C).
3. After moving the water into another glass vessel, place it in the center of the cooking tray. Set the oven to high power and operate for 51 seconds exactly. (3 seconds included as a holding time of magnetron oscillation.)
4. When heating is finished, stir the water again with the thermometer and measure the temperature ("T2").
5. Subtract T1 from T2. This will give you the water temperature rise. (ΔT)
6. The output power is obtained as follows :

$$\text{Output Power} = \frac{4.187 \times 1000 \times \Delta T}{49}$$

49 : Heating Time (sec)
4.187 : Coefficient for Water
1000 : Water (cc)
ΔT : Temperature Rise (T2-T1)

* Output (W) = 85.5x ΔT

7. Normal temperature rise for this model is 9°C to 11°C at 'HIGH'.
   NOTE 1: Variations or errors in the test procedure will cause a variance in the temperature rise. Additional power test should be done if temperature rise is marginal.
   NOTE 2: Output power in watts is computed by multiplying the temperature rise (step E) by a factor of 91 times the centigrade temperature.

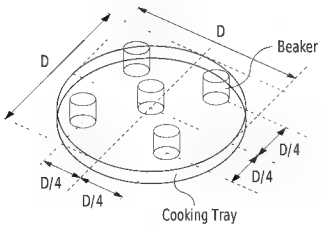
5-9 Uniformity of Microwave Heat Distribution

The microwave heat distribution can be checked indirectly by measuring the water temperature rise at certain positions in the oven:

1. Prepare five beakers made of 'Pyrex', each having 100 milliliters capacity.
2. Measure exactly 100milliliters off water load with a measuring cylinder, and pour into each beaker.
3. Measure the temperature of each water load. (Readings shall be taken to the first decimal.)
4. Put each beaker in place on the cooking tray as illustrated in the figure. Start heating.
5. After heating for 2 minutes, measure the water temperature in each beaker.
6. Microwave heat distribution rate can be calculated as follows:

$$\text{Heat Distribution} = \frac{\text{Minimum Temperature Rise}}{\text{Maximum Temperature Rise}} \times 100(\%)$$

The result should exceed 65%.



5-9 Leakage Measuring Procedure

5-9-1 Equipment

1. Microwave Energy Survey Meter
2. Glass beaker, 600cc
3 Mercurial or digital thermometer 100°C or 212°F

5-9-2 Procedure for Measurement of Microwave Leakage

1. Pour 275±15cc of 20±5°C (68±9°F) in toA 600cc graduated beaker. Place the beaker in the center of the oven.

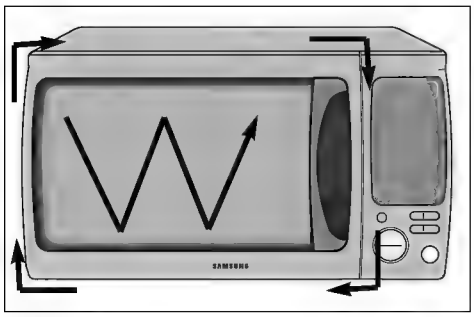
2. Start the oven and measure the leakage using a microwave energy survey meter.

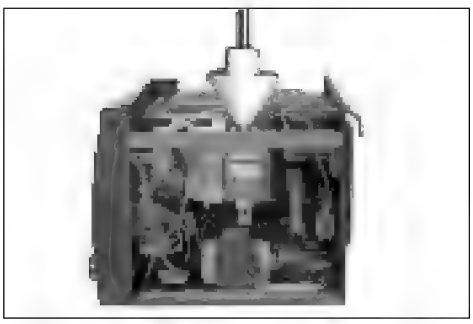
3. Set survey meter (dual ranges) to 2,450MHz.

4. When measuring the leakage, always use the 2 inch spacer cone with the probe. Hold the probe perpendicular to the cabinet door. Place the spacer cone on the door seam and move the probe along the viewing windows and exhaust openings. Move the probe at about 1 inch per second.

   If the leakage from door seam is measured near a corner, keep the probe perpendicular, making sure the probe end(at the base of the cone) does not gt closer than 2 inches to any metal (otherwise, erroneous readings readings will result).

5. The measured leakage must be less than 5mW / cm^2.





WARNING
AVOID TOUC HING THE HIGH VOLTAGE COMPONENTS.

5-9 Leakage Measuring Procedure

5-9-3 Check for Microwave Leakage (With the opter panel removed)

1. Remove the outer panel.
2. Pour 275±15cc of 20±5°C(68±9°F) water in a beaker which is graduated to 600cc, and place the beaker in the center of the oven.
3. Start the oven at the highest power level.
4. Set survey meter dual ranges to 2,450MHz.
5. Using the survey meter and spacer cone as described above, measure arnear the opening of magnetron, the surface of the air guide and the surface of the wave guide as shown in the following photo.(but avoid the high voltage components.) The neading should be less than 5mW/cm^2.

5-9-4 Measurement Notes

1. Do not exceed the limited scale.
2. The test probe must be held on the grip of the handle, otherwise a false reading may result when the operator's hand is between the handle and the probe.
3. When high leakage is suspected, do not move the probe horizontally along the oven surface; this may cause damage to the probe.
4. Follow the recommendation of the manufacturer of the microwave energy survey meter.

5-9-5 Record Keeping and Special Notification

1. After adjustment and repair of a radiation protection device, record for the measured values, and keep the data.
2. If the radiation leakage exceeds 5mW/cm^2 (after determining that all parts are in good condition, functioning properly and that central service center identical parts are replaced as listed in this manual) notify the central repair facility.
3. At least once a year have the Microwave Energy Survey Meter checked for accuracy by its manufacturer.

6. Circuit Description

6-1 When food is placed inside oven and door is closed

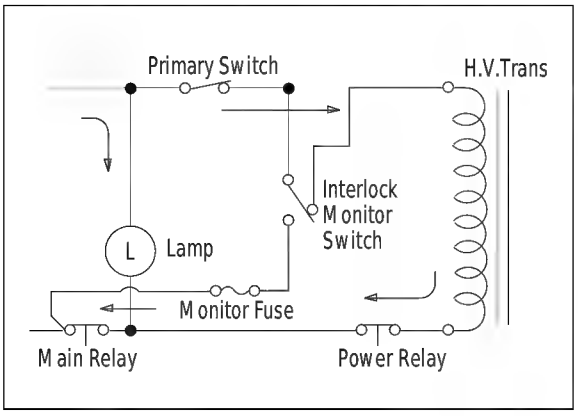
1. Low voltage transformer supplies the necessary voltage to the touch control circuit when power cord is plugged in.
2. The primary interlock switch is closed.
3. The interlock monitor switch is opened. This interlock monitor switch blows the 10A fuse and stops magnetron oscillation when the door is opened (abnormal condition).
4. The door key is caught by the door hook, this clodesthe door sensing switch is closed to send the door-close signal to the touch control circuit.

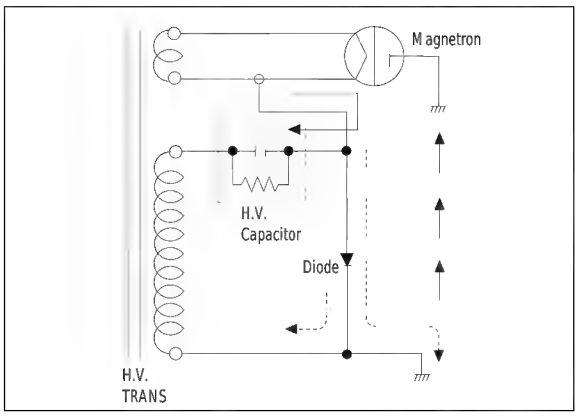
6-2 When cooking, power and time are set by touching the function pads

1. The time appears in the display window.
2. The touch control circuit stores the cooking data at.

6-3 When the START pad is touched

1. The main relay and the power control relay are controlled by the touch control circuit.
2. An oven lamp lights the inside of the oven by (The main relay in the Touch Control Circuit).
3. The fan motor rotates and cools the magnetron by blowing the air from the intake (on the back panel) over the magnetron fins. After cooling the fins, this air is directed into the oven to blow out the vapor.

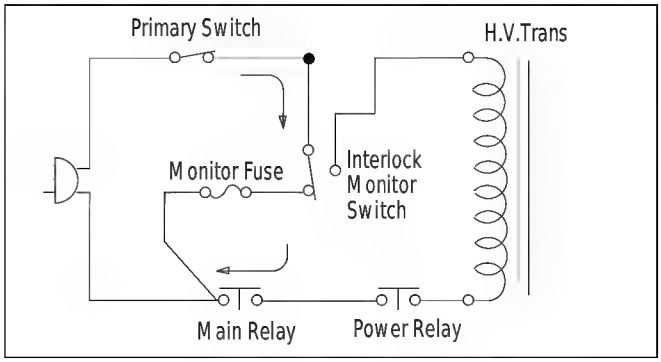




4. 230V~50Hz AC is applied to the high voltage transformer through the contacts of primary windings (shown by the solid line) just after the power control relay turns ON. (Fig. 1)
5. 3.4V AC is generated from the filament winding of the high voltage transformer. This 3.4V is applied to the magnetron to heat the magnetron filament through two noise preventing choke coils.
6. High voltage (2,230 volts AC) is generated by the high voltage transformer secondary. This secondary voltage is increased by the diode and high voltage capacitor. This resultant DC voltage is then applied to the anode of the magnetron. As shown in Fig. 2, the first half cycle of the high voltage produced in the secondary high voltage transformer charges the high voltage capacitor.The dotted lines indicate the current flow. During operation of the second half cycle, the voltage produced by the transformer secondary (plus the charge of the high voltage capacitor) is applied to the magnetron as shown in the solid line, which cawses the magnetron to oscillate. The electrlcal interference generated by the magnetron is prevented by the 1.6uH choke coils, 500pF filter capacitors and the magnetrons shielded case (so that TV and radio signals are immune).
7. The power control relay is turned on intermittently by the touch control circuit (when the oven is set at any power) except full power. The touch control circuit controls the ON/OFF time of the power control relay in order to vary the output power of the microwave oven from Low to "Full" power. One complete ON/OFF cycle of the power control is 30 seconds.
8. The cooking when the oven is set at any power setting is shown on the display (starts to count down.)

6-4 When the door is opened during cooking

1. The primary interlock switch is opened to cut off the primary voltage of the high voltage transformer. Thes stops microwave oscillation.
2. The door sensing switch is opened which signals the touch control circuit. The main relay stays on, the power control relay turns off and the display stops counting down.
3. The fan motor and turn-table motor are stopped by operation of the primary interlock switch. The oven lamp lights the inside of the oven again until the door is closed.
4. Upon opening the door, the contacts of the primary interlock switch open and the contacts of interlock monitor switch close.
5. If the contacts of primary interlock switch do not function properly, the monitor fuse blows out because of the large current surge (caused by the monitor switch activation, which stops magnetron oscillation). see Fig. 3



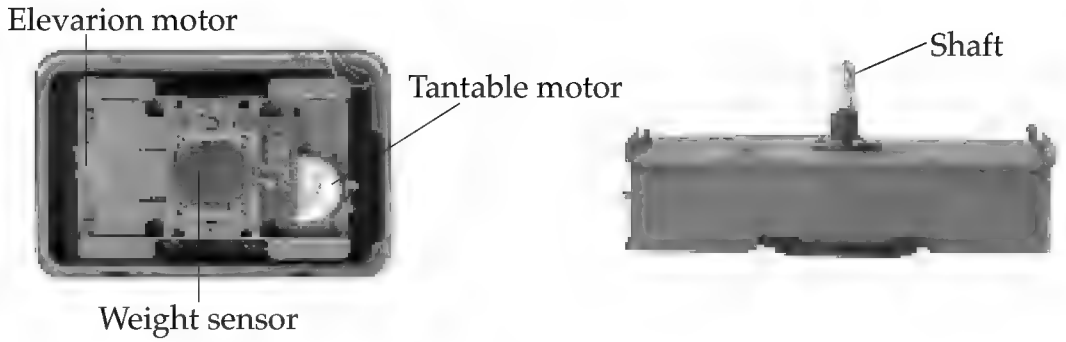
6-5 When the CANCEL pad is touched during cooking

1. Touching the CANCEL pad once stops cooking. Touching on the pad twice cancels all programs stored in the touch control circuit. The time of day reappears on the display window.
2. The oven lamp and cooking indicators turn off.
3. The fan motor stops.
4. The power control relay turns off to cutting the primary voltage to the high voltage transformer (This stops magnetron oscillation).

7. Troubleshooting

7-1 Checking the Weight Sensor

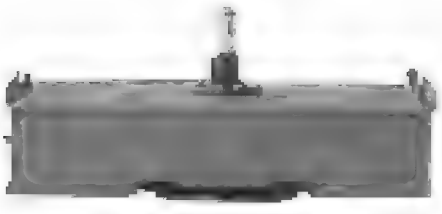
7-1-1. Overview

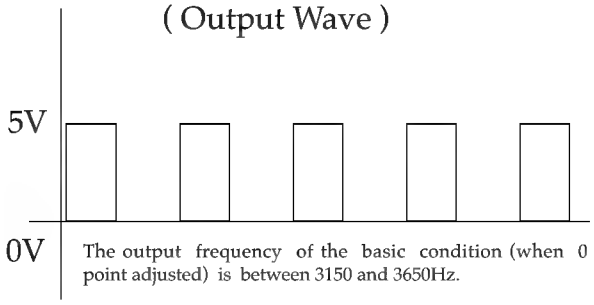


7-1-2. Operation

1. If the weight of the food is less than 1.5Kg (including the cooker), the rotating dish automatically moves to the optimum location by the elevation motor.
   (If the weight is more than 1.5Kg the cooking is done in the basic location)
2. When defrosting, the weight sensor detects the weight and moves the food to the appropriate height . (The elevation operates when the weight is less thon1.1Kg or less (including the dish)).
3. When reheating food 700g or less (including the dish), it swings once and then cookis in the basic location. (If the weight is 700g the cooking is done in the basic location)
4. Manual cooking is done in the basic location with only the rotating motor operating.

7-1-3. Operating Principle of the Height Sensor

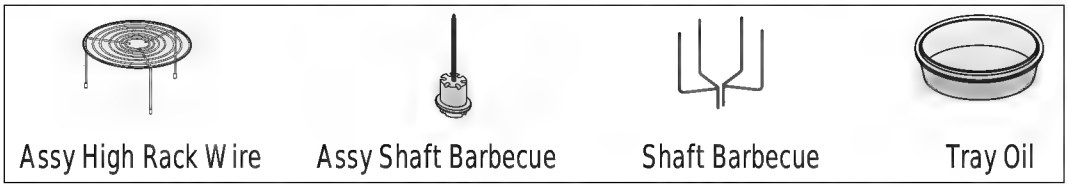




The weight sensor converts the weight of the food into a series of pulses that are compared to the"zero point" wavefrom. This frequency difference determines the cooking time.

7-1-4. Zero point and Inclination Adjustment

1. Turn the power on again and set time initial condition to "8888".
2. Put a dish inside the cooking space.
3. Press the Power level+defrost keys simultaneously until "0000"is displayed (about 5 seconds).At this time lamp and the rotating dish motor are on.
4. After 10 seconds, A normal neading is between 3150 and 3650.
5. Put the 1Kg standard weight at the center of the ceramic dish and close the door.
   (When setting the 1Kg weight, put the assy rack wire, tray oil, assy shaft barbecue and four shaft barbecue on the ceramic tray. Then do the zero point adjustement.)



6. Press the Power level+Reheat keys simultaneovsly until the "1111"is displayed. (about 5 seconds). At this time lamp and the rotating dish motor are on.
7. After 10 seconds, A normal reading is between 0350 and 0650.
8. Press the cancel key to complete the adjustment.

7-1-5. Error codes

Error indication	Cause of occurrence	Management method	Remarks
E0	Gas sensor open/short (sensor value between 6 and 211)	Check the connection and cooking reheating Put the power switch again and and use it after 10 minutes.	Automatic reheating
E1	Exceeds of T1 time limit (gas sensor)	First press the cancel key and check if the food is positiotes	Automatic reheating
E3	Sensor Thermistor Open/Short	Exchange the sensor thermistor check the wire connection	
E4	Problem with the weight sensor (Output frequency=0Hz)	Exchange the weight sensor Check the wire connection	
E6	Excess of maximum allowed time with maximum load (When cooking food that weight less tman 300g the maximum time is 10 minutes.)	When cooking 300g or less, cook within 10minutes.	
E9	Fire in cavity or overheated.	Operate oven after cooling down.	
E10	Problen with the EEPROM	Replace the PCB assy	

7-1-6. Hidden key

1. Check the gas sensor : Press the defrost and reheat keys simultaneosly.
   (Display : Between 5 and 210).
2. Child lock function : Press the clock and defrost keys simultaneosly.( )
3. Cooking completion remind function : If the food is not removed after cooking,
   the buzzer sounds every minute.
4. Sound ON/OFF : Hold the STOP/CANCEL button down over 7sec.

7-1-7. Precautions

1. Do not apply heavy load or pressure on the rotating dish
   (The elevation and the weight sensor directly contact the rotating dish).
   Putting food that exceeds 4kg(Total) can damage the weight sensor.
2. Use only genuine replacements that fit the model(C.E., rotating dish and supporter).
3. When food exceeding 300g(Total) is put on the rotating dish, the oven operates for only 10 minutes.
   (Error E6.)

7-1-8. Reparing Parts

1. Discharge the capacitor for about 5 to 6 minutes after cutting the power, and then continue the work.
2. Do not damage the coating on the wires.
3. When removing the wire the terminal, hold the positive lock case with the finger and assemble it. Otherwise use a tool (such as long nose pliers)
4. If you remove the tie during servicing, do not damage the wire. Adjust and arrange the wire and tie(heat proof onsulated tie) after the repairs have been completed.

PRECAUTION

1. FIRST CHECK THE GROUND CONNECTIONS.
2. BE CAREFUL OF THE HIGH VOLTAGE CIRCUIT.
3. DISCHARGE THE HIGH VOLTAGE CAPACITOR.
4. WHEN CHECKING THE CONTINUITY OF THE SWITCHES OR TRANSFORMER, DISCONNECT ONE LEAD WIRE FROM THESE PARTS AND THEN CHECK CONTINUITY WITHOUT THE POWER SOURCE ON. OTHERWISE YOU MIGHT DAMAGE THE METER ORGET APTISE READING.
5. DO NOT TOUCH ANY PART OF THE CIRCUIT OR THE CONTROL CIRCUIT BOARD, SINCE STATIC DISCHARGE MAY DAMAGE IT. ALWAYS TOUCH GROUND WHILE WORKING ON IT TO DISCHARGE ANY STATIC CHARGE BUILT UP.

7-2 Simple Troubleshooting Chart

Item	Checking Procedwre
Inspection of microwave oven cooking	a. Put about 200cc of tap water (water temperature 10-18°) on the rotating dish. b. Do the following :. Microwave oven high ¡ time setting 5 minute ¡ start cooking c. The water temperature should be about 80°
Inspection of grill cooking	a. Put the applicable " cooker" for grill cooking inside b. Do the following grill ¡ time setting 5 minutes ¡ start cooking. c. Normal : The seize heater is red.

7-3 Problem Analysis

7-3-1 When inserting the power plug (function selection, door on/off)

Problem	location	Cause	Measures
No alphivumeric display	a. Fuse (250V, 10A) b. Magnetron and case, temperature switch c. Power plug and socket d. 1st and 2nd of LVT e. Connector of PCB board f. Highlight indication plate g. Circuit within the PCB board	Open bad contacts Bad contacts Cut-off Bad insertion Poor Board DC fect on	Exchange Exchange Exchange,repair Exchange Repair Exchange PC Board exchange
Fuse is damaged (short circuit)	a. Power transformer b. Safety switch c. Monitor switch (short switch) d. HVC e. Latch operation	Short circuit Fusion and poor Poor operation Short circuit Poor operation	Exchange Exchange Latch adjustment Exchange Latch adjustment

7-3-2 When operating

Problem	location	Cause	Measures
Electrical shock	a. Grounding wire b. AC 230V power line is the chassis	Bad grounding Lead wire not connected Exposed part of the power line is shorting the chassis	Inspection Adjustment
Lamp is not on	a. Lamp and lead wire b. Check the lamp relay c. Thermostat 2EA d. LVTransformer	Disconnected Coil disconnected Bad contact point Is the LVT wire normal?	Exchange/adjustment Exchange Exchange Exchange/adjustment
Elevation action unsatisfactor	a.Check the connections to the elevation assembly b. Continuity between terminals of the elevation motor (Measure after removing the power leads)	Poor wire connection Disconnection	Adjustment Exchange/ Assembly exchange

7-3-2 When operating (Continued)

Problem	Inspecting location	Cause	Measures
Fuse blows out	a. Resistance between high voltage condenser terminals (Measure it after cutting the power and pulling the terminal) b. High voltage transformer (See precautions) c. High voltage transformer (Cut the power)	The nesistmce should be about 10Ω Fuse is blown if secondary winding is open Resistance neadings should be: A=about 96Ω B=about 0.0Ω C=about 1.58Ω D=¡ ~ but ween c	. Exchange
Sparks occvr durins cooking	a. Quality of the "cooker" being used b. Left-over food c. Piacement of the bupporter	Misuse of metallic material Carbonization of food left over Poor placement of rotating shaft	Explanation Explanation / and cleaning Explanation/ and adjustment
Microwdve leakage puring operation	a. Condition of the door Assembly b. The surface contacting the front of the cooking room and the door	Not enough contact in the front side of the cooking room and the door Deformation	Adjust the door hinge . Check the operating condition of the safety switch. Adjustment or exchange
Food does not heat	a. Continuity between magnetron terminals b. High voltage transformer 1st coil continuity (Measure it after cutting the power lead). c. Continuity of high voltage diode (Measure it after cutting the power leads). d. Continuity between the magnetron e. High frequency emissions f. Power relay operation g. Continuity of high voltage fuse	Disconnection Disconnection Forward direction =about 0Ω Reverse direction =500Ω Bad continuity Bad magnetron Bad contact points Disconnection	Exchange

7-3-2 When operating (Continued)

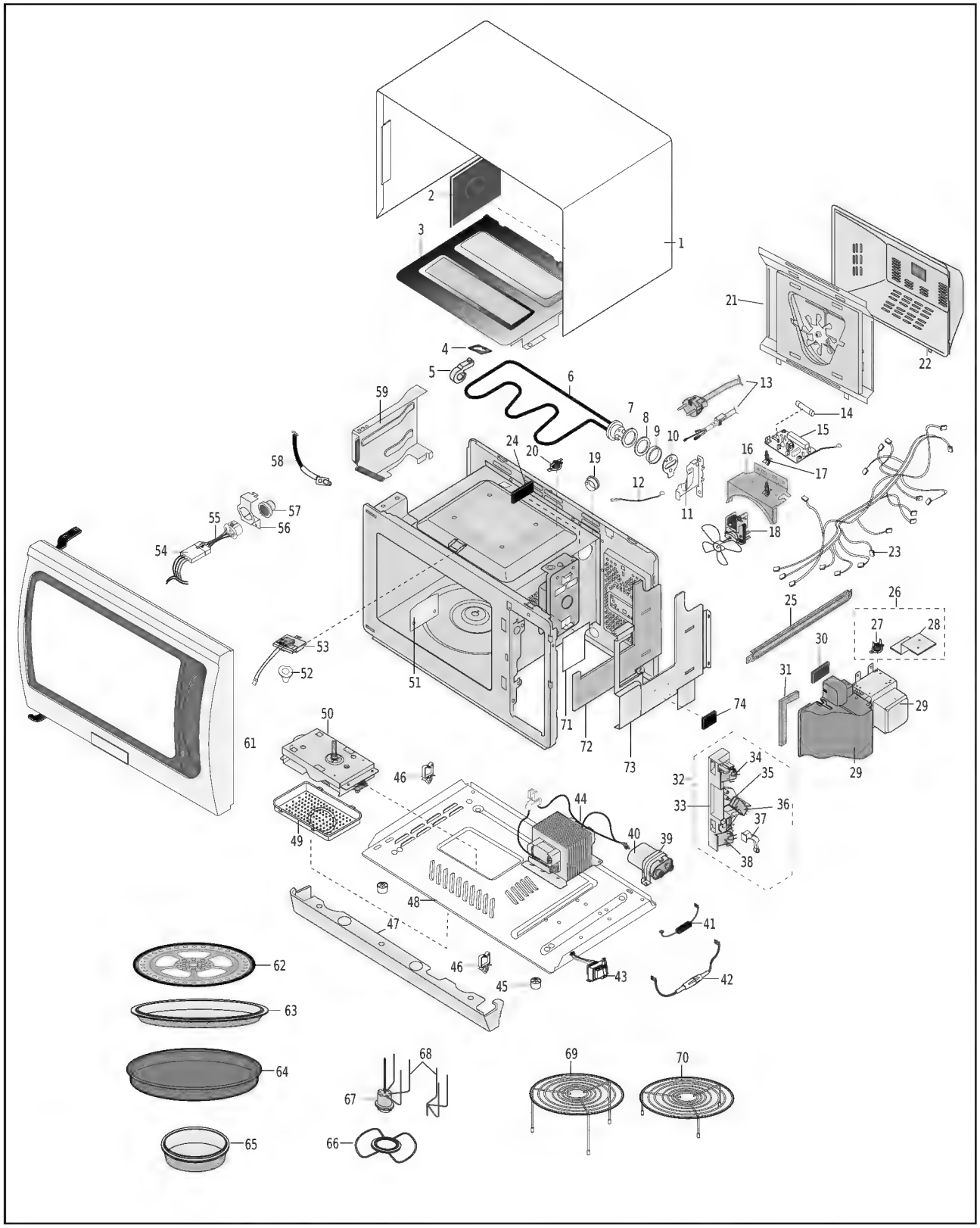
Problem	Inspecting location	Cause	Measures
Turntable motor doesn't rotate	a. Continuity between terminals (Measure after removing the power leads) b. Lead (terminal) c. Alien substance in the motor	Disconnection Needs cleaning	Exchange Adjustment Adjustment
Fan motor doesn't rotate	a. Continuity between terminals (Measure after disconnecting the power and lead wire) b. Lead (terminal) c. Rotate the fan by hand	Disconnection Poor insertion and disconnection Bad contacts needs cleaning	Exchange Adjustment Adjustment or exchange
Poor defrosting	a. Check the connections to the weight sensor b. Readjust the 0 point	Poor connection 0 point not adjusted	Adjustment Taking measures according to the error list.

7-4 After-Repair Check Listd

No	Check item	Checking and judging method	Remarks
1	Insulation resistance	When measuring the insulation resistance between the power plug and the grounding wire(with the power plug disconnected from the socket and the door closed) the resistance should be greater than 1§ or above. When to check : a. When the electric field parts are exchanged b. If the MWO is used in a very humid envir qwment c. Unit is older than 5 years	DC 500V Megatester
2	Safety switch operation	Check that the safety switch is operating correctly when opening and closing the door	Safety switch Monitor switch Door detection switch
3	Applicability of parts	Check that exact replacement parts are being used	AC 230V
4	Placement of lead wire	Check for looseness, jamming or terminal insertion of the lead wire. (check that there are no shorts to ground.	
5	Connection of screw and bolt	Check the connection between he screw and bolt.	
6	Alien substance insertion check	Check for a cut line within the equipment, combustible foreign matter, or loose hardware.	
7	Power cord check	Check that there is no damage to the cord, plug, socket etc. Also check that power rating is adequate.	
8	Grounding check	Check that the main body is grounded to the PCB. Explain to the customer that he following are dancerous hazards : a. Connection to the gas pipe b. Connection to the vinyl water pipe c. Connection to the telephone line.	For the PCB ground wire and power cord ground wire, Check the continuity to ground.

8. Exploded Views and Parts List

8-1 Exploded Views



8-2 Main Parts List

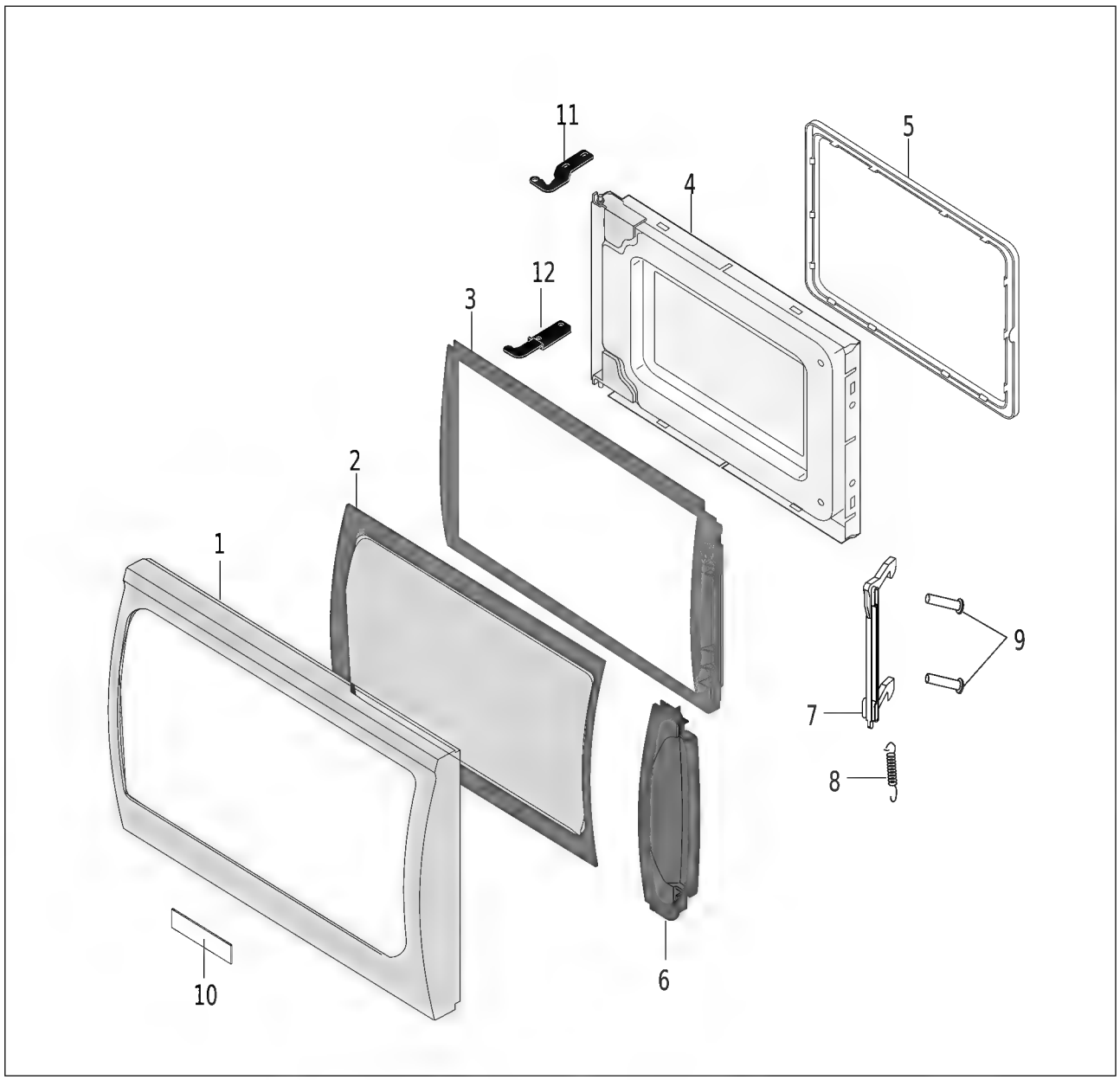
Ref. No.	Parts No.	Description	Specification	Q'ty	Remarks
1	DE70-30029Z	PANEL-OUTER	SECC T0.6 W405.5 L1174.8 SC-WH	1	
2	DE63-90035G	CUSHION-RUBBER	DFA20 T2 W190 L100 BLK	1	
3	DE61-50073D	BRACKET-UPPER	ALSTAR T0.6 W273 L432 MB6544W	1	
4	DE61-70060A	SPRING-PLATE	SK-5 T0.5	1	
5	DE61-30006A	SUPPORTER-HEATER	ALUMINA 5G 2ND-W/P	1	
6	DE47-70031B	HEATER-GRILL	D6.8 230V 1400W 37.0OHM RE-130	1	● ⚠
7	DE60-40009B	WASHER-TEFLON	SLOT ID22.2 OD28 T1.2 TEFLON	1	
8	DE63-20017A	GASKET-HEATER	BRASS T1.5 OD30.5 ID22.5	1	
9	DE60-90006A	FLANGE-RING	C3604BD ID22.1 OD26 L4.7 MBGF4	1	
10	DE61-50347A	BRACKET-EARTH	BSS2-A T1.0 W35 L43 MBGF45	1	
11	DE61-50115A	BRACKET-HEATER	BSS2-A T1.0 W55 L55.5 M9GF45	1	
12	DE39-40409A	WIRE HARNESS-E	230V50HZ M9G45 CTW	1	●
13	DE39-20058C	ASSY POWER CORD	KKP-4819D/B232 250V16A L1700 G	1	
15	DE91-40042A	ASSY NOISE FILTER	DNA-1019C 250V 10A CMO-CERAMIC	1	
16	DE71-60134A	COVER-BLOWER	SECC T0.8 W152 L157	1	
17	DE61-30129A	SUPPORTER-PCB	DASS-T9N	4	
18	DE31-10086G	MOTOR-FAN	AMM92-002AUEB-1 230V/50Hz 2550	1	●
19	DE65-20031A	BUSHING	DASB-16N 17.8X6.3 NYLON NTR SH	1	
20	DE47-20041A	THERMOSTAT	CS-7SA 160/60 PAWA	1	
21	DE92-90078A	ASSY-CASING	RE-1300 230V EUROPE	1	● ⚠
22	DE71-60058C	COVER-BACK	SCP2(CR) T0.6 W385.5 L275 BLK-	1	
23	DE39-40683A	WIRE HARNESS-A	230V50HZ CE1279KSE RUSSIA	1	
24	DE63-90062A	CUSHION-RUBBER DOOR	RUBBER(CR) T9 W30 L50 RE-1300	1	
25	DE61-30132A	SUPPORTER-MGT	SECC T0.6 W38 L342.5 MW6630T	1	
26	DE91-70101B	ASSY-THERMOSTAT	RE-542 160/60 187TYPE	1	●
27	DE47-20007A	THERMOSTAT	PW-2N(160/60)187Z 250V7.5A 160	1	
28	DE61-50490A	BRACKET-TCO	SECC1 T0.6 34 58	1	
29	DE03-30035A	MAGNETRON	OM 75PH((31)ESS	1	⚠
29	DE71-60303A	COVER-AIR	NYLON#66 95G RE-1300 BLK	1	
31	DE63-90002A	CUSHION-AIR	POLYURETHANE-FOAM T4 W30 L50 R	1	
32	DE93-20020A	ASSY BODY LATCH	RE-43B/90B	1	
33	DE66-40021A	LATCH-BODY	POM (F20-02) 50G RE-330	1	
34	3405-000178	SWITCH-MICRO	250V 15A 200gf SPST-NO	1	
35	DE72-60106A	GUIDE-S/W	ABS BLK	1	
36	3405-000175	SWITCH-MICRO	250V 15A 200gf SPST-NO	1	
37	DE66-90054A	LEVER-SWITCH	POM (F20-02) 15G NTR RE-330	1	
38	3405-000178	SWITCH-MICRO	250V 15A 200gf SPST-NO	1	
39	DE61-50106A	BRACKET-HVC	SECC T0.8 W31 L125.8	1	
40	2501-001029	C-OIL	1.05uF 2100V BK 35x54x90 20mm	1	
41	DE59-40001A	DIODE-H.V	HVR-1X-32B-12	1	
42	DE91-70061B	ASSY-H.V.FUSE	THV060T-0750-H 5KV0.75A RED	1	
43	DE26-20005C	TRANS-L.V	SLV-751E2 230V 50HZ AC11/17.5/	1	
44	DE26-10042B	TRANS-H.V	Y9245NTC-1 230V 50HZ AC2230V M	1	● ⚠
45	DE61-40064A	FOOT	PP BLK	4	
46	DE65-20025A	CABLE CLAMP	DAWS-2NB NYLON66 NTR WIRE SADD	2	
47	DE64-90038A	DECORATION-FOOT	PC 200G RE-751	1	●
48	DE80-10038A	BASE-PLATE	SGCC1-Z T0.8 W360.5 L588 RE-75	1	
49	DE61-50081A	BRACKET-COVER MOTOR	SGCC1-Z T0.6 W219.8 L280.3	1	
50	DE93-90003A	ASSY-ELEVATION	RE-751/652	1	● ⚠

8-2 Main Parts List

Ref. No.	Parts No.	Description	Specification	Q'ty	Remarks
51	DE71-60313A	COVER-CEILING	MICA SHEET T0.5 W48.5 L117 RE-	1	
52	DE67-40064A	GLASS-LAMP	GLASS T3.0 W28 L15 RE-751	1	
53	DE91-70155A	ASSY-LAMP	RE-652/751 CERAMIC	1	
54	DE39-40641A	WIRE HARNESS-S	AC220V60HZ GAS_SENSOR RE-753	2	
55	DE39-40613A	WIRE HARNESS-D	220/60HZ RE-644 DOMESTIC	1	
56	DE61-50301A	BRACKET-COVER	SBHG1-A RE-707GMS	1	
57	DE32-60013A	SENSOR-GAS	ST-MWO	1	
58	DE32-10013A	SENSOR-THERMISTOR	PT-312-K2	1	● ⚠
59	DE72-60035L	GUIDE-AIR	SECC (T)0.6 (W)240 (L)242.5 RE	1	
61	DE92-40001P	ASSY DOOR	CE1279KSE(SBTW) WHT HANDLE	1	● ⚠
62	DE92-90018B	ASSY-TRAY SUB	STS304 RE-751/652	1	●
63	DE74-20045A	TRAY-CERAMIC	RE-909CG	1	●
64	DE74-20107A	TRAY-BROILER	SPP O.8T 345 345 345 ENAMEL SI	1	●
65	DE74-20022A	TRAY-OIL	GLASS(NEOREX) T5 PI210 600G	1	●
66	DE92-90334A	ASSY-LEG	M 9GF45	1	●
67	DE92-90433A	ASSY-SHAFT BARBECUE	CE979GSE STS304 D6	1	●
68	DE72-80062A	SHAFT-BARBECUE	STS304 D3 L149 W60.25 CE97	6	●
69	DE92-90019P	ASSY-WIRE RACK	CE1279KSE HIGH	1	
70	DE92-90019Q	ASSY-WIRE RACK	CE1279KSE LOW	1	
71	DE01-00051B	FILM-LAMP	T0.25 W105 L85 CLEAR RE-751	1	
72	DE62-90046A	ADIABATIC-RIGHT	T3 W219.3 L214.8 RE-1300	1	●
73	DE71-60294A	COVER-ADIABATIC	SECC T0.6 W249.7 L353.5 RE-130	1	●
74	DE63-90065E	CUSHION-LAMP	PUT-FOAM T40 W10 L90 M 6245	1	

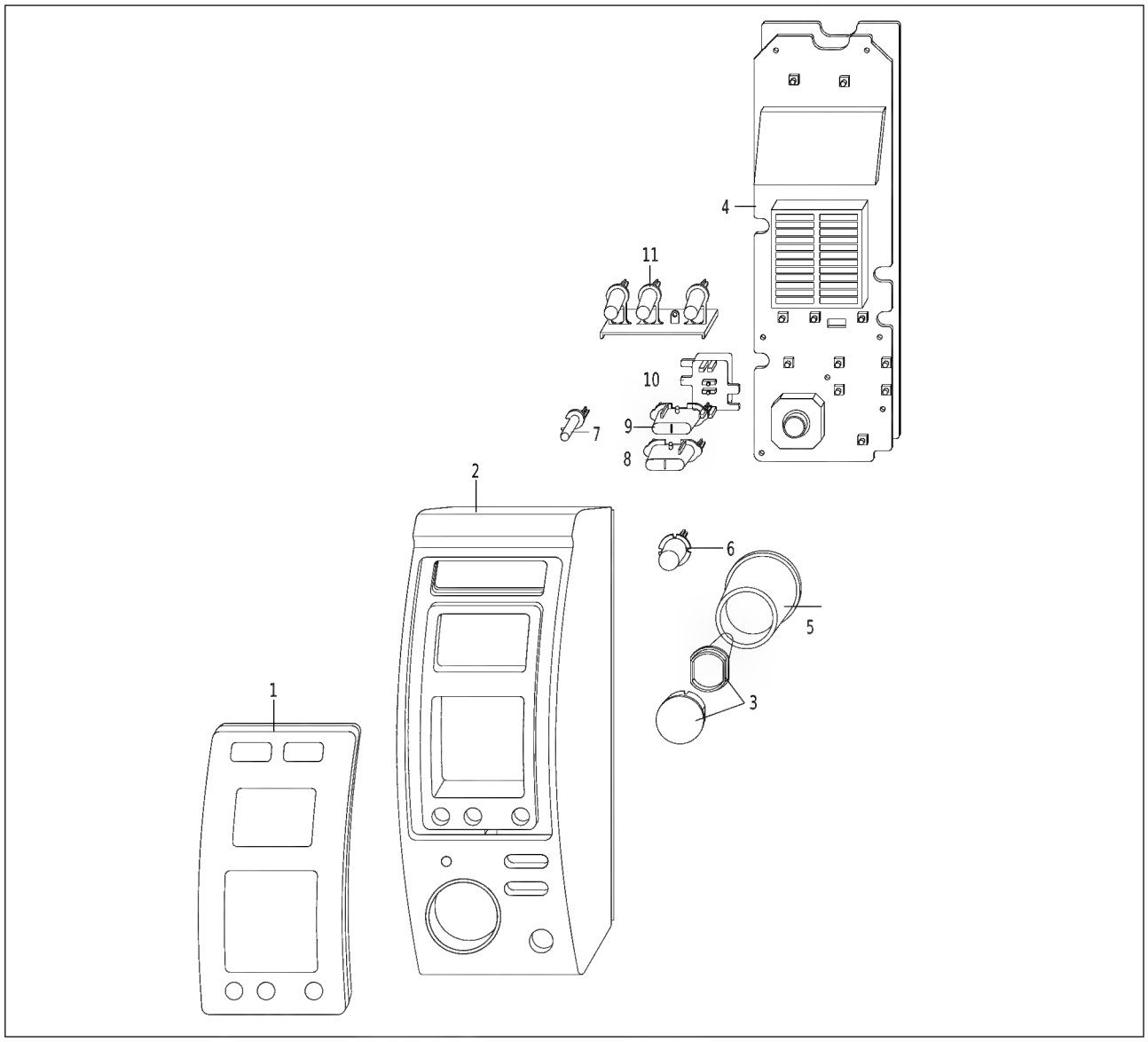
● : Option Parts ⚠ : Warning ⚠ :Electrostatically Sensitive Devices

8-3 Door Parts List



Ref. No.	Parts No.	Description	Specification	Q'ty	Remarks
1	DE64-40078J	DOOR-A	PC 110G WHT CE1279KSE	1	● ⚠
2	DE67-20033C	SCREEN-DOOR-B	TEMP.GLASS T4 W260 L378 BLK CI	1	●
3	DE64-40079A	DOOR-SUB	PC NTR 60G RE-751/652	1	●
4	DE92-50002F	ASSY DOOR-E	SELANT BLK	1	
5	DE64-40173A	DOOR-C	PBT BLK 24G RE-1300	1	
6	DE64-20024A	HANDLE-DOOR	PC BLK 89G RE-751/652	1	●
7	DE64-40175A	DOOR-KEY	POM(TC3005) BLK 13G RE-330	1	
8	DE61-70041B	SPRING-KEY	ES HSW 3 PI0.7 D4.9 BLUING RE-7	1	
9	DE60-60073A	PIN-HINGE	MOLD 4 17.5	2	
10	DE68-10001A	LABEL-BRAND	AL SAMSUNG S/S 8.0 50	1	●
11	DE61-80037C	HINGE-UPPER	SCP1 T3.0 W26 L76 ZP2C-W MB245	1	
12	DE61-80006B	HINGE-LOWER	ZP2W T3.0 ZN(PLATING) RE-552	1	

8-4 Control Parts List



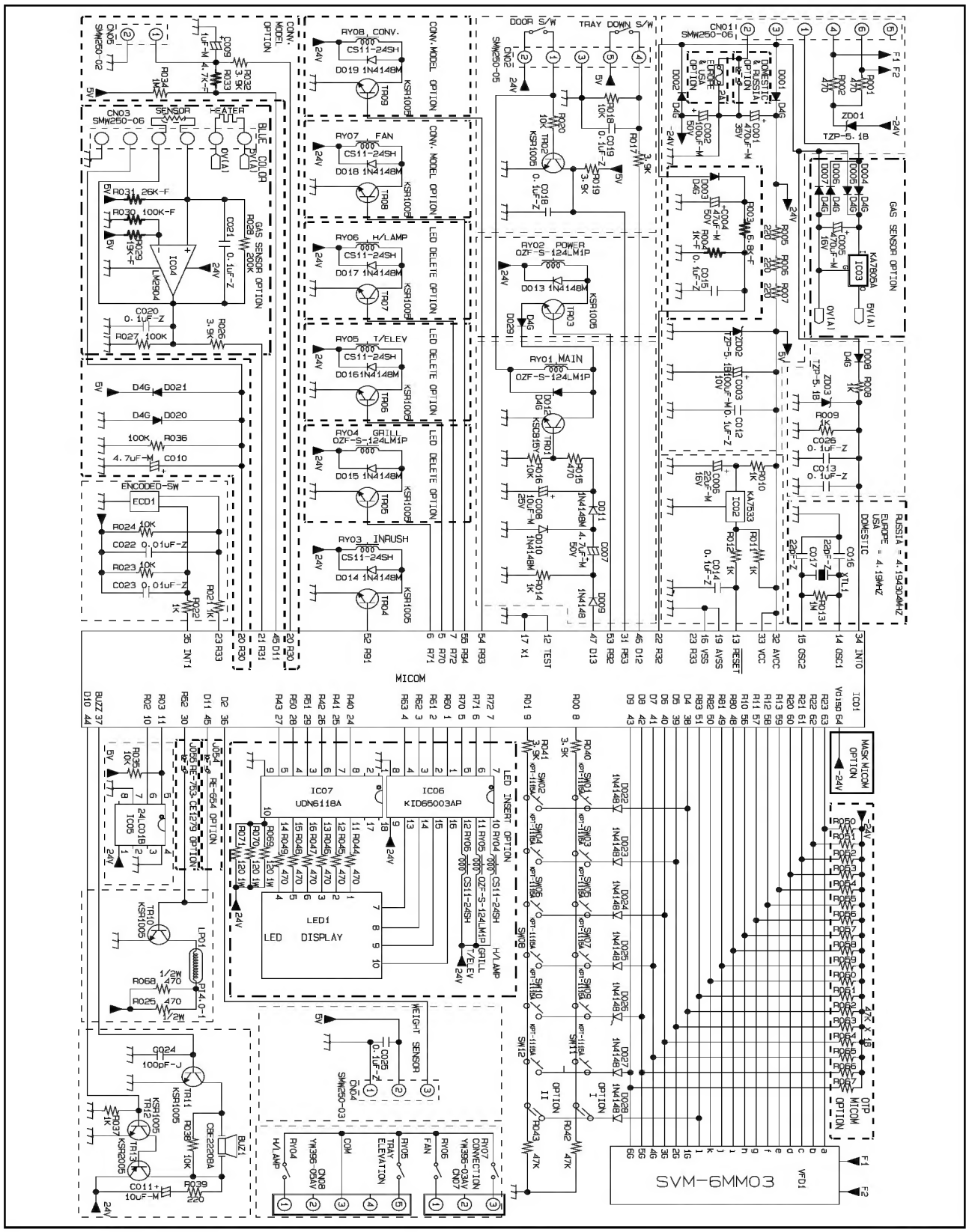
Ref. No.	Parts No.	Description	Specification	Q'ty	Remarks
1	DE92-90439T	ASSY-CONTROL FRAME	MOLD&FILM CE1279KSE GRAY	1	●
2	DE72-70088P	CONTROL-PANEL	PC 140G WHT CE1279KSE	1	●
3	DE92-90443C	ASSY-BUTTON START	CE979GSE CIS	1	●
4	DE91-10497A	ASSY P.C.B-MAIN	RC-753-02 230V50HZ VFD CE1279	1	● ⚠
5	DE64-10049A	KNOB-COVER	ABS NTR 9G RE-642	1	●
6	DE66-20071A	BUTTON-SELECT-E	ABS NTR 20G RE-751/652	1	●
7	DE66-20070A	BUTTON-SELECT-F	ABS NTR 20G RE-751/652	1	●
8	DE66-20272E	BUTTON-SELECT(D)	ABS NTR 20G RE-751W	1	●
9	DE66-20073J	BUTTON-SELECT-C	ABS 20G WHT CE1279KSE	1	●
10	DE66-20074A	BUTTON-CAP	ABS NTR 20G RE-751/652	1	●
11	DE66-20066A	BUTTON-SELECT-B	PC NTR 6G RE-642	1	●

8-5 Standard Parts List

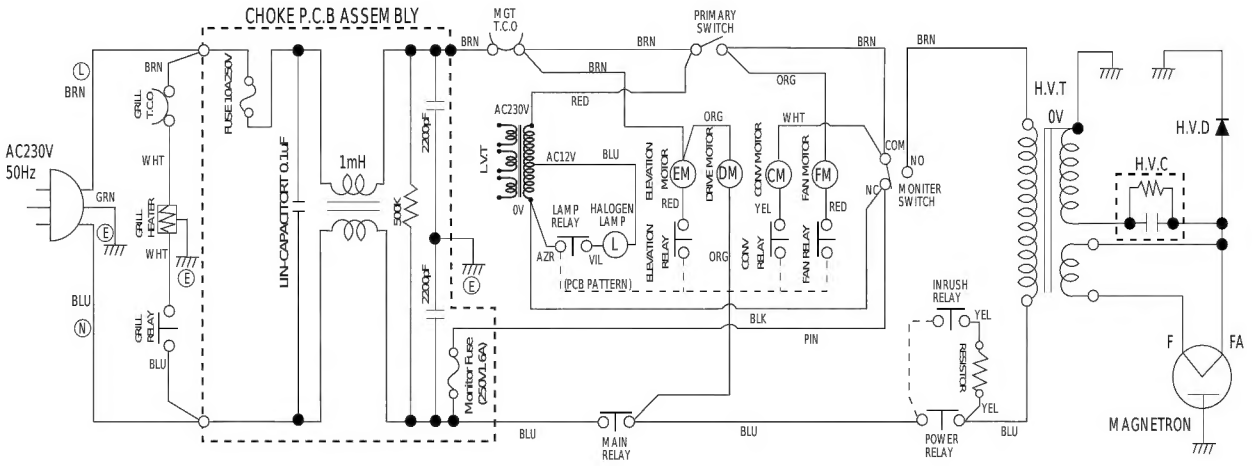
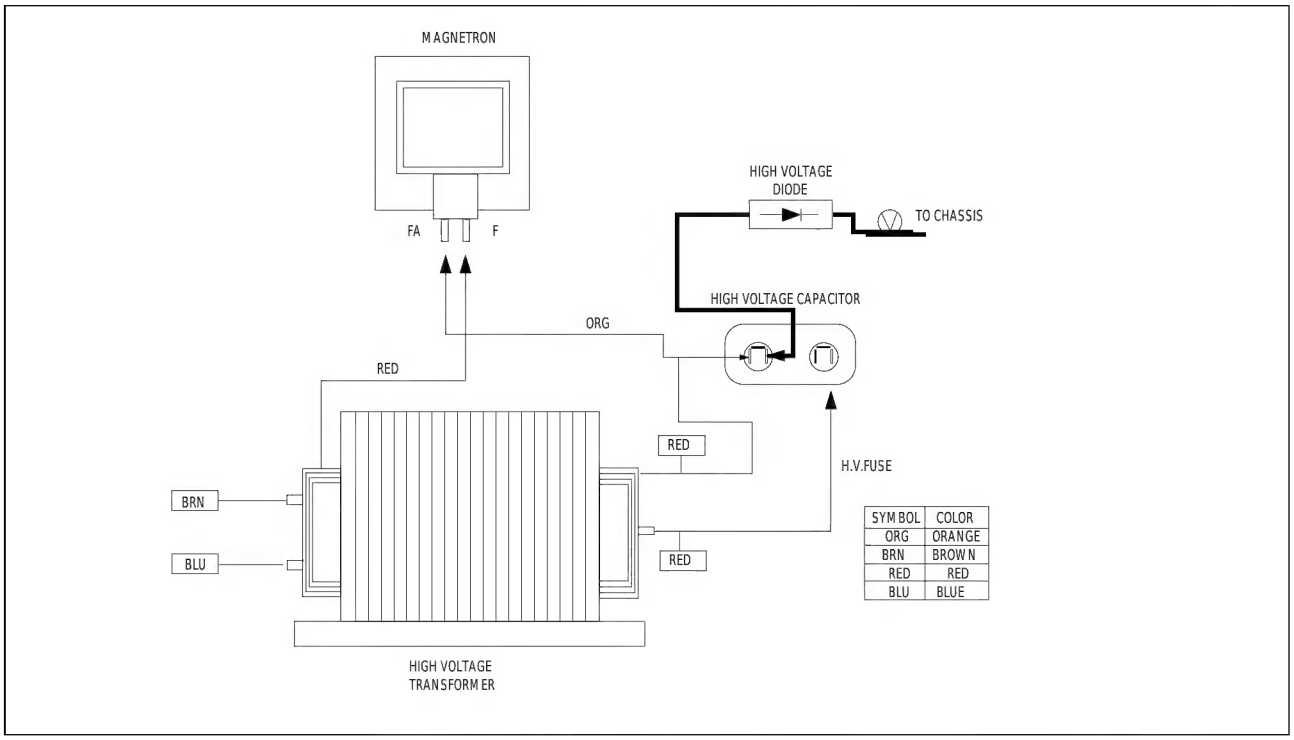
Parts No.	Description	Specification	Q'ty	Remarks
DE60-10012A	SCREW-TAP TITE	TH +3 M4 L10 SWR10 ZPC2 TOOTH	1	NO-FIL
DE60-10012A	SCREW-TAP TITE	TH +3 M4 L10 SWR10 ZPC2 TOOTH	1	P-CORD
DE60-10012A	SCREW-TAP TITE	TH +3 M4 L10 SWR10 ZPC2 TOOTH	1	EPCB-E
DE60-10013A	SCREW-ASSY TAP	TH 2S 4 L12 MSWR3 ZPC3 FIBER	1	C-CLAM
DE60-10013A	SCREW-ASSY TAP	TH 2S 4 L12 MSWR3 ZPC3 FIBER	2	COVF/M
DE60-10016A	SCREW-ASSY MACHINE	TH 4 L10 STS430	2	F/MOTOR
DE60-10018A	SCREW-ASSY MACHINE	PH M4X0.7P 8 MSWR10 SN1 WS	2	B-EARTH
DE60-10034A	SCREW-TH	TH +M4 L10 STS304	1	TEMP
DE60-10046A	SCREW-TAP PH	PH M3 L8 FEFZY	1	MGT-TCO
DE60-10052A	SCREW-TAP PH	PH M4 L8 FEFZY	1	B-H-UPP
DE60-10080A	SCREW-WASHER	M5 L12 2S	4	HVT
DE60-10080A	SCREW-WASHER	M5 L12 2S	4	MGT
DE60-10082H	SCREW-A	2S-4X12 TOOTHED	1	
DE60-10082H	SCREW-A	2S-4X12 TOOTHED	7	
DE60-10082H	SCREW-A	2S-4X12 TOOTHED	3	
DE60-10082H	SCREW-A	2S-4X12 TOOTHED	1	
DE60-10082H	SCREW-A	2S-4X12 TOOTHED	12	
DE60-10082H	SCREW-A	2S-4X12 TOOTHED	2	
DE60-10082H	SCREW-A	2S-4X12 TOOTHED	4	
DE60-10082H	SCREW-A	2S-4X12 TOOTHED	2	
DE60-10082H	SCREW-A	2S-4X12 TOOTHED	1	
DE60-10082H	SCREW-A	2S-4X12 TOOTHED	2	
DE60-10082H	SCREW-A	2S-4X12 TOOTHED	5	
DE60-10082H	SCREW-A	2S-4X12 TOOTHED	1	
DE60-10098A	SCREW-ASSY TAP TITE	PH TC M4X8 SWRCH18A ZPC2 GLD W	4	ELEVA
DE60-10122A	SCREW-TAP TH	TAP TH 2-4X8 FE FN	2	
DE60-10122A	SCREW-TAP TH	TAP TH 2-4X8 FE FN	2	
DE60-10122A	SCREW-TAP TH	TAP TH 2-4X8 FE FN	1	LAMP
DE60-20014A	BOLT-FLANGE	M5 L10 MSWR3 FEFZY	2	HI-LOW
DE60-20014A	BOLT-FLANGE	M5 L10 MSWR3 FEFZY	2	HI-UPP
DE60-30016A	NUT-FLANGE	M4 MSWR10	1	TEMP
DE60-10045A	SCREW-TAP PH	PH M3 L6 FEFZY	1	-
DE60-10098A	SCREW-ASSY TAP TITE	PH TC M4X8 SWRCH18A ZPC2 GLD W	4	-
DE60-30016B	NUT-FLANGE	M4 MSWR10 FEFN	1	-
DE60-10012A	SCREW-TAP TITE	TH +3 M4 L10 SWR10 ZPC2 TOOTH	1	HVD
DE60-10082H	SCREW-A	2S-4X12 TOOTHED	4	
DE60-10193A	SCREW-TAPPING	TH M4 L25 MSWR18 FEFZY YEL	4	-
DE60-10045A	SCREW-TAP PH	PH M3 L6 FEFZY	1	-

9. P.C.B Diagrams

9-1 P.C.B Diagrams



9-2 P.C.B Parts List

Parts No.	Description	Specification	Q'ty	Remarks
1003-001033	IC-SOURCE DRIVER	TD62781AP DIP 18P 300MIL OCTAL	1	IC07
3501-001015	RELAY-POWER	24V 21 8mA 16A 1FormA 20mS 10m	3	RY01~03
3501-001016	RELAY-MINIATURE	24V 12 5mA 5A 1FormA 8mS 4mS	5	RY04~08
3710-000132	CONNECTOR-SOCKET	12P 1R 2 5mm STRAIGHT SN	2	CN11,12
3711-000797	CONNECTOR-HEADER	BOX 2P 1R 2 5mm STRAIGHT SN	1	CN05
DE07-10086A	V.F.DISPLAY	SVM 06MM 25 RED/GRN 6 68 81 7X8	1	VFD1
DE07-90019A	LAMP-PILOT	PI4 0 1 DC12V 60MA ORG DI4 1 L	1	LP01
DE13-20016A	IC-VOLT REGU	KA7805A TO 220AB 1A 0/125C	1	IC03
DE13-20017A	IC-DRIVE	KID65003AP DIP 16P STICK TR AR	1	IC06
DE30-20016A	BUZZER	CBE2220BA STICK	1	BUZ1
DE34-20071A	SWITCH-ROTARY	DC10V 1MA SH PA 1005A 003 000	1	ECD1
DE37-90020A	CONNECTOR ASSY	YJN25012 PLATE 73MM WHT	2	CN9,10
DE61-90065A	HOLDER-DIGITRON	NYLON#66 BLK	1	-
de91-20570A	ASSY PCB AUTO-MAIN	230V50HZ CE1279	1	-
0401-001002	DIODE-SWITCHING	1N4148M 100V 200mA 500mW 3nS D	10	D009~14,18,19,22,23
0401-001002	DIODE-SWITCHING	1N4148M 100V 200mA 500mW 3nS D	4	D024~27
0402-001103	DIODE-RECTIFIER	1T4 400V 1A TS 1 TP	8	D1,2,4~8,29
0501-000388	TR-SMALL SIGNAL	KSC815 NPN 400mW TO 92 BK 120	1	TR01
0504-001014	TR-DIGITAL	KSR1005 NPN 300mW 4 7K 10K TO	8	TR2,3,4,8~12
0504-001015	TR-DIGITAL	KSR2005 PNP 300mW 4 7K 10K TO	1	TR13
2001-000004	R-CARBON	200Kohm 5% 1/8W AA TP 1 8x3 2m	1	R028
2001-000273	R-CARBON	100Kohm 5% 1/8W AA TP 1 8x3 2m	1	R027
2001-000290	R-CARBON	10Kohm 5% 1/8W AA TP 1 8x3 2mm	7	R16,18,20,23,24,35,38
2001-000429	R-CARBON	1Kohm 5% 1/8W AA TP 1 8x3 2mm	9	R8~12,14,21,22,37
2001-000435	R-CARBON	1Mohm,5%,1/8W,AA,TP,1.8x3.2mm"	2	R13,34
2001-000515	R-CARBON	220ohm 5% 1/8W AA TP 1 8x3 2mm	1	R039
2001-000613	R-CARBON	3 9Kohm 5% 1/8W AA TP 1 8x3 2m	5	R17,19,26,40,41
2001-000780	R-CARBON	470ohm 5% 1/8W AA TP 1 8x3 2mm	3	R1,2,15
2001-000786	R-CARBON	47Kohm 5% 1/8W AA TP 1 8x3 2mm	2	R042,43
2001-000776	R-CARBON(S)	470ohm 5% 1/2W AA TP 2 4x6 4mm	8	R025,44~49,68
2001-001107	R-CARBON(S)	220ohm 5% 1/2W AA TP 2 4x6 4mm	3	R5,6,7
2003-000160	R-METAL-OXIDE(S)	120ohm 1% 1W	3	R69~70
2004-000195	R-METAL	100Kohm 1% 1/8W AA TP 1 8x3 2m	1	R030
2004-000433	R-METAL	1Kohm 1% 1/8W AA TP 1 8x3 2mm	1	R004
2004-001137	R-METAL	6 8Kohm 1% 1/8W AA TP 1 8x3 2m	1	R003
2004-001976	R-METAL	19Kohm 1% 1/8W AA TP 1 8x3 2mm	1	R029
2004-001977	R-METAL	26Kohm 1% 1/8W AA TP 1 8x3 2mm	1	R031
2202-000127	C-CERAMIC,MLC-AXIAL	10nF +80 20% 25V Y5V TP 7 5	2	C22,23
2202-000780	C-CERAMIC,MLC-AXIAL	100nF +80 20% 50V Y5V TP 3 5x1	10	C12~15,18~21,25,26
2401-000247	C-AL	100uF 20% 10V GP 6 3x11mm 5m	1	C004
2401-000446	C-AL	10uF 20% 25V GP 5x11x5 0mm	1	C008
2401-000466	C-AL	10uF 20% 35V GP TP 5x7 5	2	C6,11
2401-000725	C-AL	2200uF 20% 35V	1	C001
2401-000621	C-AL	2 2uF 20% 50V TP 5x11 5mm	1	C007
2801-003214	CRYSTAL-UNIT	4 194304MHz 50ppm 28 AAA 12pF	1	XTL1
3711-000203	CONNECTOR-HEADER	1WALL 3P 1R 3 96mm ANGLE SN	2	CN06,08 ⚠
3711-000241	CONNECTOR-HEADER	1WALL 4P 1R 3 96mm STRAIGHT SN	1	CN07 ⚠
3711-000881	CONNECTOR-HEADER	BOX 3P 1R 2 5mm STRAIGHT SN	1	CN04 ⚠
3711-000999	CONNECTOR-HEADER	BOX 5P 1R 2 50mm STRAIGHT SN	1	CN02 ⚠
3711-001036	CONNECTOR-HEADER	BOX 6P 1R 2 50mm STRAIGHT SN	1	CN03 ⚠
3711-001038	CONNECTOR-HEADER	BOX 6P 1R 2 5mm STRAIGHT SN	1	CN01 ⚠
DE09-30227A	IC-MCU	24LC01B/P DIP DIP EEPROM	1	IC05
DE13-20007A	IC-OP AMP	KA2904 DIP	1	IC04
DE13-20009A	IC	KA7533 DIP	1	IC02
DE39-60001A	WIRE-SO COPPER	PI0 6 SN T 52MM TAPING_WIRE	63	J01~63

10. Schematic Diagrams